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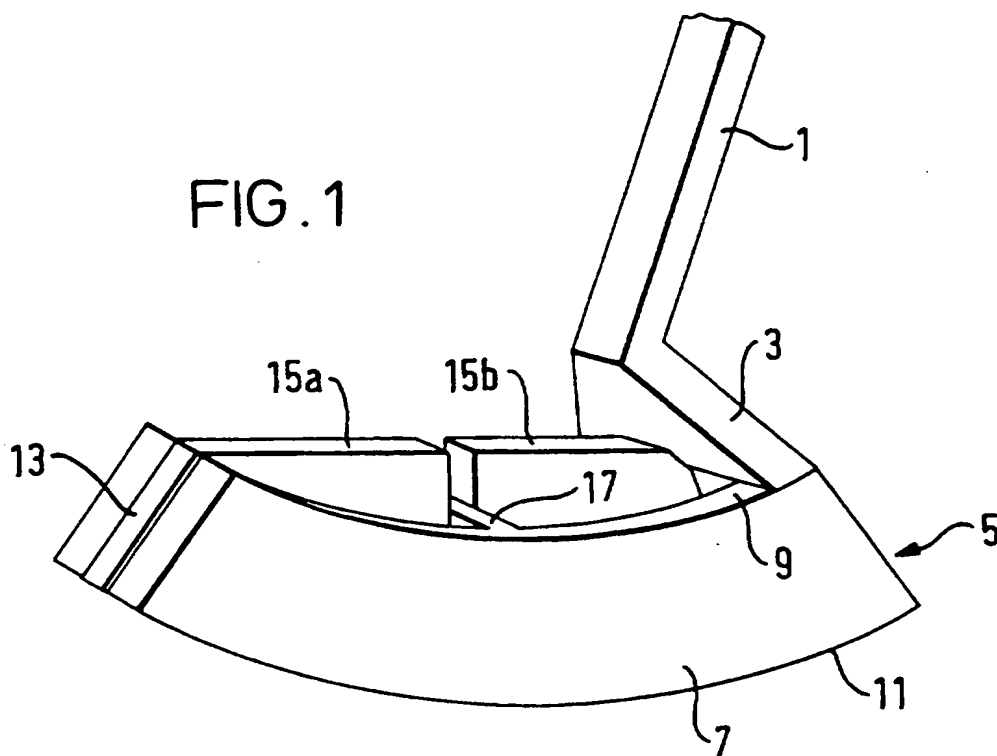
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(54) **Golf club**

(57) A golf putter, has a head (5) and a shaft (1), wherein the head (5) may have an arcuate base (11) having a radius of curvature of e.g. about 10 cm, or less. The head (5) has a planar striking surface (7) and is symmetrical about a plane parallel to the striking surface, the axis of the shaft (1) lying in the plane of symmetry. In preferred embodiments, the head (5) is at least about 3-5 cm thick in a direction perpendicular to the striking surface (7). The head may be provided with a ridge or marker (17) perpendicular to the striking surface. Weight portions (13,21) are provided located adjacent the outer edges of the head, each portion (13,21) being arranged substantially symmetrically about the plane of symmetry.



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FIG. 1

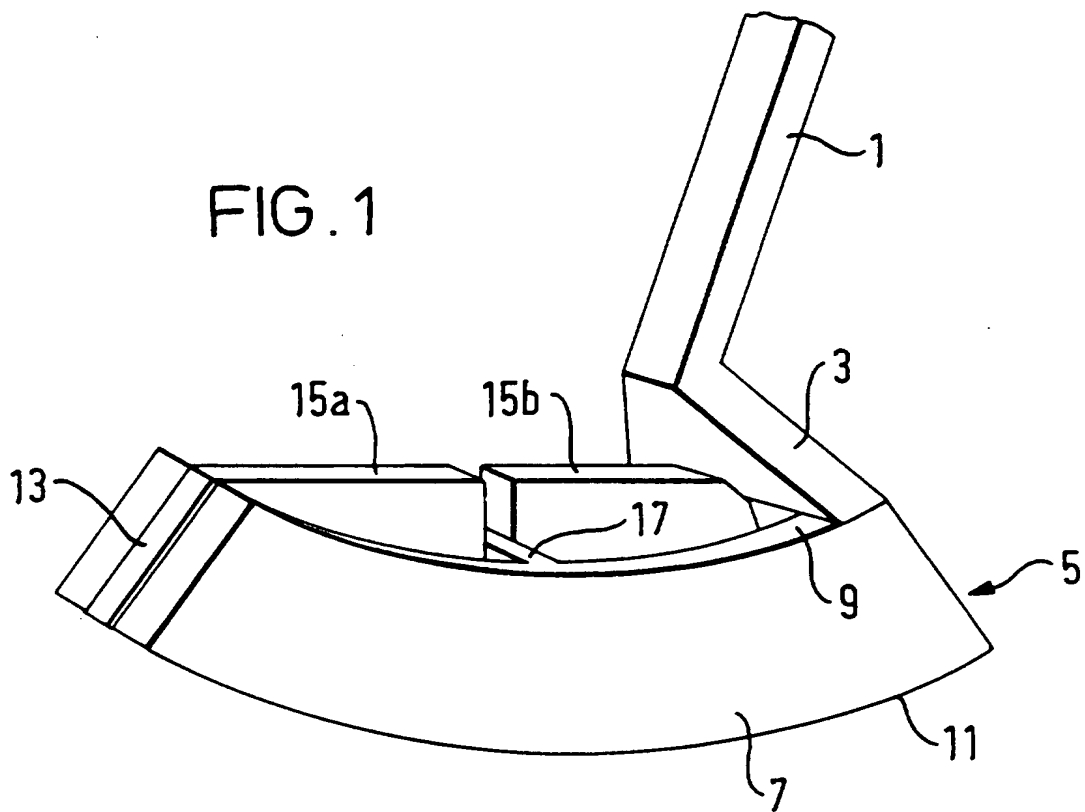
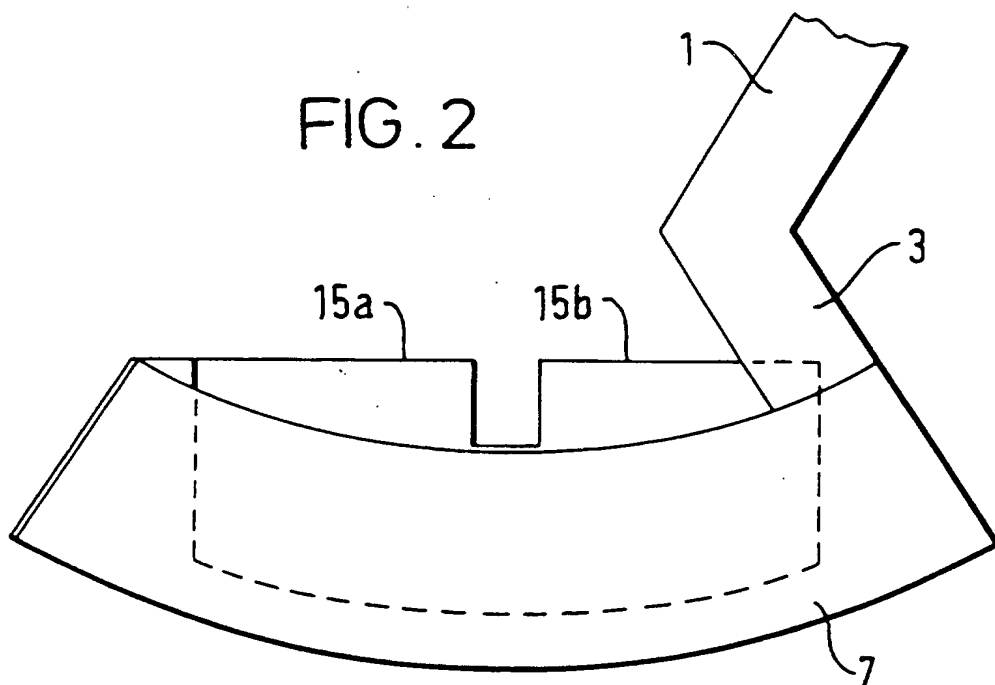


FIG. 2



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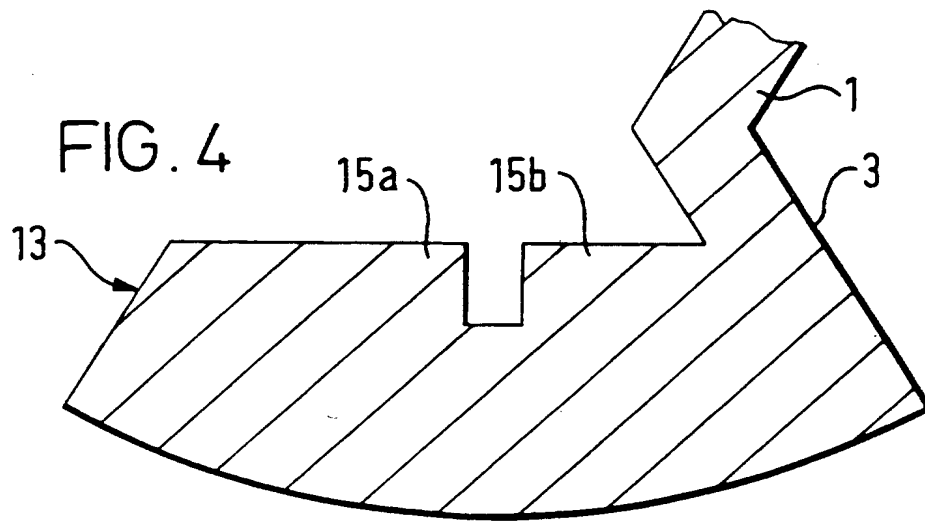
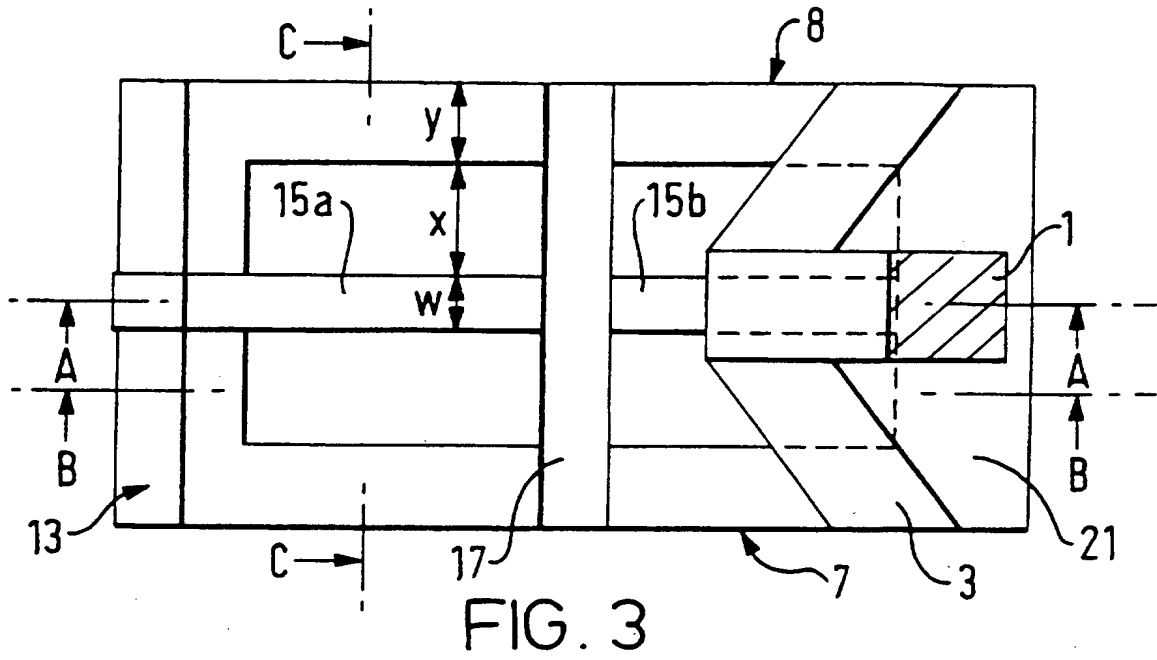


FIG. 5

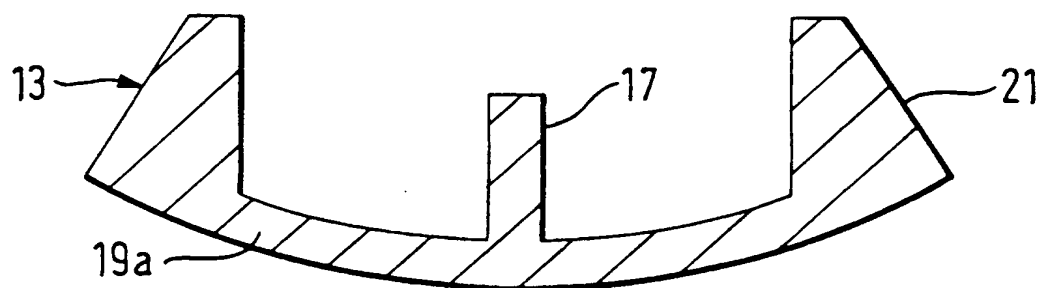


FIG. 6

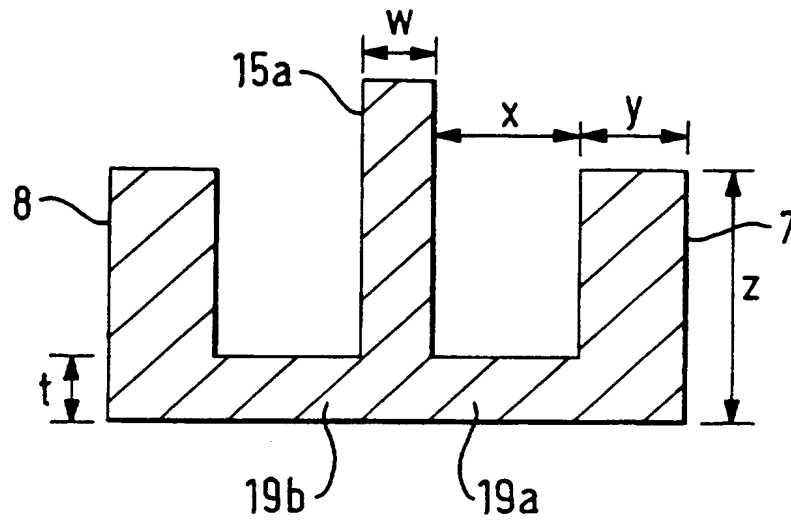
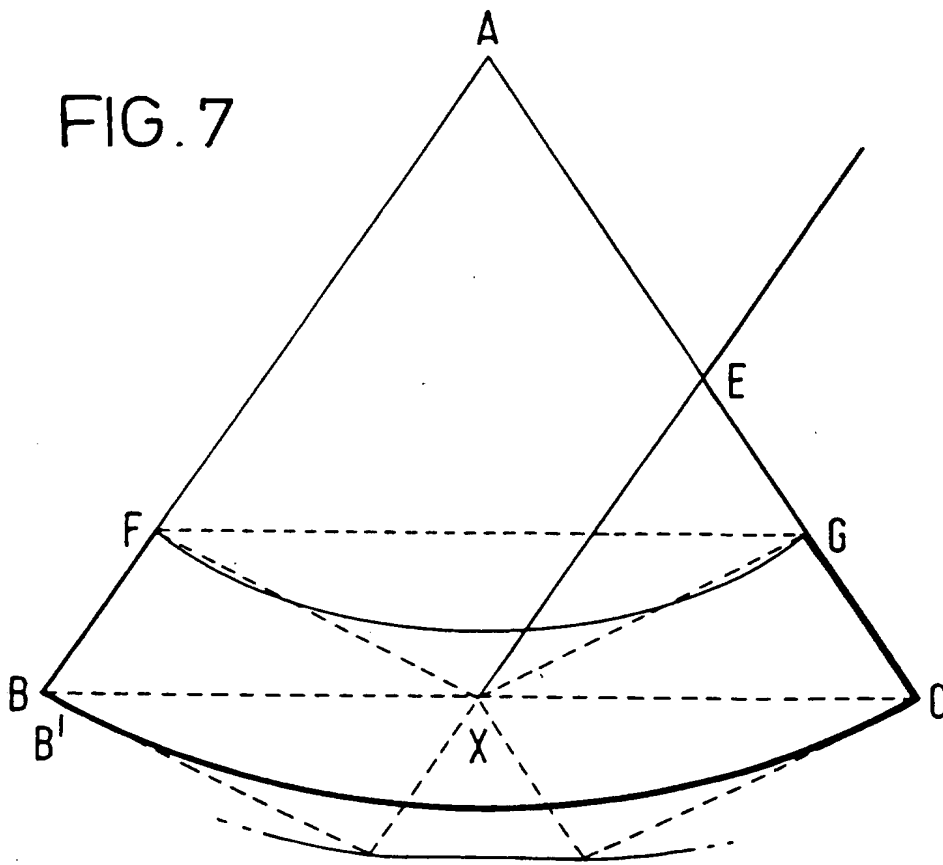


FIG. 7



GOLF CLUB

The present invention relates to a golf club, particularly to a putter.

A conventional putter comprises an elongate head having a substantially planar elongate striking surface and a shaft attached to the head extending away from the head in a plane substantially parallel to the striking surface, the shaft being angled at a maximum of 80° to the direction of the long axis at the striking surface. The rules of golf do not allow this angle between the shaft and the head to be more than 80° (i.e. the shaft must be at least 10° to vertical in use). The putter is swung with said plane in which the shaft extends from the head substantially perpendicular to the intended direction of travel of the golf ball.

A known simple form of putter comprises a head in the form of a narrow solid elongate head, about 1 cm thick attached to a shaft. Other known putters have a variety of projections extending from the rear of the head.

The conventional putter suffers the drawback that the trajectory of the head, and hence the trajectory of

the golf ball, cannot readily be precisely estimated. The trajectory is not aligned with the direction in which the shaft extends from the head. The accuracy of putting is dependent on a player's ability to maintain a steady swing keeping the head of the club at right angles to the intended trajectory of the golf ball. Thus the handling characteristics or "feel" of the putter are very important.

The present invention seeks to overcome the above drawbacks by providing a putter in which the direction of swing may be more readily aligned with the intended direction of travel of the golf ball, or which has improved handling.

Accordingly, the present invention provides a putter comprising a head attached to a shaft, the head having at least a first substantially planar striking surface, a putter head being substantially symmetrical about a plane parallel to the first striking surface, the shaft lying in the plane of symmetry. The putter is preferably relatively thick, for example at least 1 inch (2.5 cm). This is found to give improved handling characteristics.

Advantageously, the surface substantially parallel to and facing away from said first striking surface is

also adapted for striking a golf ball, to provide a second striking surface.

This may allow the putter to be used by either a left-handed or a right-handed player.

Preferably, the first (and second, when present) striking surface comprises a planar section having a lower edge bounded by an arc of a first circle and an upper edge bounded by an arc of a second circle concentric with the first circle. This may provide better balancing of the club, and allow the shaft to be angled so that the golf ball is initially struck at a desired point in the stroke.

Preferably, the head of the putter comprises a linear projection (ridge) or visible line marker in the plane of symmetry of the putter, and thus with the axis at the shaft.

Preferably, the head of the putter comprises a visible line or linear projection substantially perpendicular to said first striking surface, and aligned with an optimum striking area on said first striking surface. This may facilitate alignment of the putter.

Preferably the putter head is relatively thick, for example at least 2.5 cm thick, and more preferably about

5 cm (2 inches) thick. With a head 5 cm thick, the axis of the shaft is about 2.5 cm behind the striking face, and this is found to impart surprisingly good handling characteristics to the club.

Preferably the aforementioned perpendicular sight-line extends over a major substantially portion of the thickness of the head. This may provide a relatively long line to facilitate alignment of the putter. For example the sight-line may be about 5 cm (2 inches) long.

Preferably, the head comprises first and second relatively massive portions located respectively on first and second sides of, or all around, the centre of mass, adjacent the outer edges of the head. This concentration of mass towards the outside of the head results in a higher moment of inertia for a given putter mass. This may reduce the tendency of the putter to twist if the golf ball is struck by a part of the striking surface away from its mid-point. The first and second relatively massive portions may comprise the first and second striking surfaces respectively, resulting in a compact design.

Similarly, the head preferably comprises relatively massive portions located either side of the optimum

striking point on said first striking surface. In a similar manner, this results in a higher moment of inertia about said optimum striking point, reducing the tendency of the putter to twist. Preferably the lower face of the head is curved, advantageously forming an arc of a circle. Most preferably, the arc has a radius of curvature of about 10 cm (4 inches), or less. Thus the area of contact between the putter and the ground can be made small. A radius of curvature of about 10 cm is found to give surprisingly good stability.

Advantageously the head has at least one cavity or recess inbetween said relatively massive portions. This reduces the overall mass of the putter. In a most preferred construction, the head has a first solid portion whose surface provides said first striking surface, a central ridge in the plane of symmetry of the head, and a second solid portion opposite the first solid portion, the surface of which can provide the aforementioned second striking surface, with recesses between the solid portions and the central ridge.

According to a development, additional masses may be inserted in said recess or recesses. In this way the mass of the putter can readily be adjusted, and may be

selected by a user after manufacture.

The invention also provides a kit comprising a putter having a recess in the head thereof and at least one mass adapted for insertion into said recess.

An embodiment of the present invention will now be described, by way of example, with reference to the following drawings in which:

Fig. 1 is a perspective view of a golf club;

Fig. 2 is a view from one side;

Fig. 3 is a plan view;

Fig. 4 is a section along A of Fig. 3;

Fig. 5 is a section along B of Fig. 3;

Fig. 6 is a section along C of Fig. 3;

Fig. 7 is a schematic diagram for explaining the principle of construction of the embodiment.

As can be seen in Fig. 1, a golf club comprises a shaft 1 attached by an angled portion 3 to a head 5. The head 5 comprises a first planar striking surface 7 having arcuate upper and lower edges 9, 11 respectively.

A surface 13 perpendicular to the first striking surface 7 is located on the face of the head 5 away from the point at which the head 5 is attached to the angled portion 3 of the shaft 1. The surface 13 is typically

substantially parallel to the shaft 1.

As can be appreciated from Fig. 3, the head is symmetrical about a plane passing through the centre of the surface 13 and the shaft 1. The head has a second striking surface 8 on the other side from and parallel to the first striking surface 7.

Referring to Fig. 4, ridge like protrusions 15a and 15b having flat upper surfaces coincident with the plane of symmetry are provided to facilitate visual alignment of the putter with a golf ball. In this embodiment, the upper surfaces lie along a chord of the arc of the upper edge of the striking surfaces 7,8.

As shown in Fig. 5, in a similar manner, a ridge 17 is provided perpendicular to the optimum impact point on the striking surface 7. As well as providing a sight line, the ridge may serve as a structural member reinforcing the striking surfaces.

As can be seen in Fig. 6, the material of the head is concentrated towards the outside, at either side at the plane of symmetry. In particular, the first and second striking faces 7,8, which account for a significant proportion of the mass of the head, are positioned at the outside edges of the face 13. This

results in a relatively high moment of inertia.

Typically, the projections 15a, 15b have a width w of $\frac{1}{4}$ inch (6.4 mm), and are joined by base portions 19a, 19b having a width x of $\frac{1}{2}$ inch (12.7 mm) and thickness t of $\frac{1}{4}$ inch (6.4 mm) to a striking faces 7,8 having width y of $\frac{3}{8}$ inch (9.5 mm) and a height z of 1 inch (25.4 mm). The total width of the second striking face 13 being 2 inch (50.8 mm). In this embodiment, the ridge 15a is continued along the face 13 as ridge 13a, which can be seen most clearly in Fig. 1. The ridges need not be solid, and portions of the ridges 15a,15b may be cut out or otherwise omitted to reduce the mass of the club.

Referring back to Fig. 4, the projection 15a is typically $1\frac{1}{8}$ inch (34.9) long, and projection 15b is typically $\frac{7}{8}$ inch (22.2 mm) long. This provides a clearly visible line for visual alignment of the putter.

Advantageously, the head is integrally formed (e.g. by moulding or machining) from a single piece of material. The choice of material is determined by the requirements for sufficient strength and correct weight. In addition, the striking surfaces 7 and 8 must be precisely shaped and smooth. Examples of suitable materials are metal, such as stainless steel, or

titanium, ceramics material, graphite and plastics material, or a composite. Stainless steel is preferred due to the combination of high strength with ease of manufacture, but titanium, graphite or composites can provide a lighter club.

Highly toughened glass can readily be formed into a smooth durable surface. Insets of such highly toughened glass or similar material may be provided on the striking surfaces 7 and 8 although this requires a precisely manufactured recess in the head to accommodate the inset, and a uniform adhesive layer joining the insert to the head. If the club is not required to be used by left and right-handed players, only one of surfaces 7 or 8 may be adapted as a striking face, resulting in a slight asymmetry.

The shape of the arcuate planar sections which form the first and second striking surfaces 7,8 will now be described, with reference to Fig. 7. A template consisting of an equilateral triangle ABC having sides of 4 inches (10 x 2 mm) is constructed. The mid point X of the line BC is found, as is the mid point E of the line AC. Points F and G are identified a quarter of the way along the lines BA and CA respectively (in this case 1

inch (25.4 mm) from B and C respectively). An arc centred on point A extending from F to G (having a radius of 3 inches (76.2 mm)) is constructed, and similarly an arc (of radius 4 inch (102 mm)) is constructed joining B to point C. If the ground were perfectly flat, it would only contact the putter along a line perpendicular to the striking faces 7, 8, where it forms a tangent plane to the arc, thus in practice the area of contact is made small, reducing drag. The line XE is extended away from the triangle to locate the axis of the shaft 1.

The shaft 1 has a $\frac{1}{2}$ inch (12.7 mm) square section, although other sections, such as circular may be used, and is centred on the continuation of the line XE.

The angled portion 3 joining the head 5 to the shaft 1 comprises a section $\frac{1}{2}$ inch (12.7 mm) thick located with one face coincident with the line GE and perpendicular to the plane of the triangle ABC as can best be seen in Figs. 1 and 2. The angled portion 3 is tapered from the head 5 which is 2 inches (102 mm) wide to the shaft which is $\frac{1}{2}$ inch (12.7 mm) wide.

With this construction, an area adjacent the point X is the "sweet spot", which is the optimum point for striking a golf ball. This point is aligned with the

axis of the shaft 1 and is located at the mid point of the striking surface 7. Furthermore, with the dimensions given, allowing for a clearance between the bottom of the putter and the ground, the sweet spot is located close to the height of the perimeter of the golf ball (i.e. at the point of impact). This may reduce the tendency of the putter to twist when used in the conventional manner for striking a golf ball with the first striking surface 7.

In a modified construction (not shown), the shaft 1 is angled at between 10° and 20° , and most advantageously 14° to the line AX. The back portion 3 can have a slight curvature, instead of being straight and parallel to the rear face 21 as shown. The face 13 may be made parallel to the shaft 1. This construction is best understood with reference to the dashed lines shown in Fig. 7.

Referring back to Fig. 5, a cross section through the head 5 parallel to and behind the first striking surface 7 includes the second striking surface 13 typically having a 1 inch (25.4 mm) high face and being shaped as a truncated wedge joined by a $\frac{1}{4}$ inch (6.4 mm) thick base 19a to a similarly shaped rear section 21, to which the angled portion 3 is joined.

A ridge 17 $\frac{1}{4}$ inch (6.4 mm) wide and $\frac{3}{4}$ inch (19.1 mm)

high is positioned at the mid point, aligned with the sweet spot X to facilitate visual alignment of the putter with the ball. This provides a visible line about 2 inches (5 cm) long.

Thus, as can be seen, a large proportion of the mass is located towards the outside edges of the striking face 7, resulting in a relatively high moment of inertia about the sweet spot X.

Although reference is made to the first striking surface 7, which is to be used by a right-handed player, it will be appreciated that due to the symmetry, the same considerations apply to the second striking surface 8, which is for use by a left-handed player.

The surface 13, which extends perpendicular to the plane, of the triangle, parallel to the line FB, is parallel to the axis of the shaft 1. When the putter is swung in a plane parallel to the plane of the equilateral triangle ABC, the second striking surface precedes the axis of the shaft 1.

Since the shaft is located behind the striking surfaces 7,8, this tends to give a small amount of lift to the ball, reducing the tendency of the ball to bounce.

As can best be seen from Fig. 3, the above

construction provides a putter head having four recesses, with the majority of the mass concentrated at the exterior of the head. It is possible to insert additional masses (not shown) into the recesses to adjust the mass of the club. Alternatively it is relatively simple to machine material out of the interior without affecting the balance substantially. Thus the mass of the club can be adjusted after manufacture to suit a player. Additional masses may be a friction fit, or may have other engaging means to retain them in place.

It is important to note that all dimensions are given by way of example only. The dimensions used may vary significantly depending on the material chosen, and the desired weight and strength of the putter. Similarly, the geometric relationships between the parts of the putter may be altered as necessary.

In particular, the dimensions may be adjusted to optimise dynamic balancing of the head and/or static balancing.

CLAIMS:

1. A putter comprising a head and a shaft, the head having a substantially planar striking surface and being substantially symmetrical about a plane parallel to the striking surface, the axis of the shaft lying in the plane of symmetry, the head being at least about 3 cm thick in a direction perpendicular to the striking surface.
2. A putter according to claim 1 wherein the surface facing away from said striking surface is arranged as a second striking surface.
3. A putter according to claim 1 or claim 2 wherein the head is about 5 cm thick.
4. A putter according to any one of the preceding claims wherein at least one recess is provided in the head.
5. A putter according to claim 4 wherein the head comprises a first solid portion providing said striking surface, a central ridge located in the plane of symmetry, and a second solid portion, said second solid portion being substantially a mirror image of said first solid portion, said solid portions and ridge being joined

by a base of generally lower height than said solid portions and said ridge.

6. A putter according to claim 5 wherein the central ridge has at least one recess or hole located between the substantially flat upper surface and the base.

7. A putter according to any one of the preceding claims having a substantially straight ridge or marker substantially perpendicular to said striking surface provided on said head.

8. A putter according to any one of the preceding claims wherein said head has an arcuate base.

9. A putter according to claim 8 wherein said arcuate base has a radius of curvature of about 10 cm, or less.

10. A putter comprising a head and a shaft, the head having an arcuate lower face having a radius of curvature of about 10 cm, or less.

11. A kit containing a putter having a recess in the head thereof and at least one additional mass adapted and arranged for insertion into said recess, to be retained therein.

12. A putter substantially as herein described with reference to the accompanying drawings.



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Claims searched: 1-9,12

Examiner: David Whitfield
Date of search: 14 August 1995

Patents Act 1977 Search Report under Section 17

Databases searched:

UK Patent Office collections, including GB, EP, WO & US patent specifications, in:

UK Cl (Ed.N): A6D D23A, D23B, D23C

Int Cl (Ed.6): A63B 53/04

Other:

Documents considered to be relevant:

Category	Identity of document and relevant passage	Relevant to claims
X	GB2255287A (WALKER) (WHOLE DOCUMENT)	1-4, 7-9
"	GB1374421 (BARTRON) (" ")	1-4
"	GB1008972 (SMYTH) (" ")	"
"	US4529202 (JACOBSON) (" ")	1-4, 8, 9
"	US4289311 (SMITH) (" ")	1-4
"	US4253667 (CLARK) (" ")	"

X	Document indicating lack of novelty or inventive step	A	Document indicating technological background and/or state of the art.
Y	Document indicating lack of inventive step if combined with one or more other documents of same category.	P	Document published on or after the declared priority date but before the filing date of this invention.
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